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TRAINING FOR WAR INDUSTRY

Training-on-the-Job

and

Up-Grading

BULLETIN No. 4

Published by

DEPARTMENT OF LABOUR, OTTAWA

Hon. Humphrey Mitchell, *Minister*

Bryce M. Stewart,
Deputy Minister

A. MacNamara,
Associate Deputy Minister

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INTRODUCTION

The purpose of this bulletin, as in the case of those preceding it in the series, is to indicate to employers in Canadian war industries the various forms of training that are being employed to produce those skills in men and women that will enable them to produce the required munitions of war with which to equip the fighting services.

Three previous bulletins have dealt with Pre-employment Training, Apprenticeship, and Plant Schools. This bulletin (No. 4) deals with training on the job and upgrading.

In the appendix will be found some typical examples outlining the experience and practices of a number of Canadian firms who have incorporated upgrading methods in their training programs.

The first example (DeHaviland Aircraft), designates a general approach to the upgrading of employees. The second example (Canadian International Paper and affiliated companies), illustrates the principle of upgrading on a vertical basis, while the third example (Sorel Industries Limited), typifies the movement of employees through all operations in the plant by the method commonly referred to as the rotative process.

51248—1½

List of Regional Directors of the War Emergency Training Program

Following is a list of regional directors of the War Emergency Training Program who are prepared to assist manufacturers engaged in war production on problems connected with training-on-the-job and upgrading of employees:

Nova Scotia ..... Dr. F. H. Sexton,
Nova Scotia Technical College, Halifax.

New Brunswick ..... W. K. Tibert,
Department of Education, Fredericton.

Quebec ..... Gabriel Rousseau,
7345 Garnier Street, Montreal.

Ontario ..... H. H. Kerr,
East Block, Parliament Buildings, Toronto.

Manitoba ..... S. M. Mutchmor,
4th Floor, Customs Building, Winnipeg.

Saskatchewan ..... W. A. Ross,
Department of Education, Regina.

Alberta ..... J. H. Ross,
128—7th Avenue West, Calgary.

British Columbia ..... Lt.-Col. F. T. Fairey,
Department of Education, Victoria.

The Supervisor of Training, Department of Labour, Ottawa, will gladly put manufacturers' representatives in touch with consultative advisers in their territory.

TRAINING ON THE JOB

Training on the job, while apparently a simple matter, should, in the light of the present emergency, be geared to the program of training as a whole. This warning is given to direct attention to the fact that before a plan for training on the job is decided on, careful consideration should be given to a number of questions among which are:

1. Is the person charged with the responsibility of training competent to teach?
2. Has the best production method been determined?
3. Will the trainees produce in quality and volume as planned?
4. What relationship does initial training bear to later forms of training likely to be developed?

It should be obvious to anyone confronted with the problem of training-on-the-job that in order to achieve the most desirable results careful planning of the training method to be adopted should precede decision to use it, so that maximum results may be secured. So convinced has one of the foremost Canadian producers of munitions become on the question of the relationship between the quality and character of instruction given on-the-job and output, it has recently begun a course of training "How to Teach" which will be given, starting with top management, to roughly one in ten of its total personnel. This experiment in preparing for on-the-job training is being carefully observed by officials of the War Emergency Training Program and if found successful it will be made available to war contractors generally in every branch of war production. This is important since every man and woman entering industry requires some measure of training on-the-job before being left to work alone on a new job no matter what his background of experience or training may have been. Training on-the-job is by far the most widespread form of training used by industry, hence the importance that attaches to it. A recent survey of Canadian war industries showed that according to statistics furnished by eight hundred and twenty-four firms, five thousand eight hundred persons were in training as apprentices, two thousand six hundred were in training in plant schools while sixty-two thousand were in training on-the-job.

In developing a program of training on-the-job care should be taken to relate it to the need for training as a whole, since it is recognized to-day as it has perhaps not been recognized before, that continuing training of all trainable personnel is the only means to provide against a dangerous shortage of persons capable of advancing to positions of higher skill and responsibility. This is particularly true when industry is expanding at a rapid pace. There is also the necessity to provide against a shortage brought about through enlistments or the operation of selective service measures.

Depending on circumstances, training on-the-job may be given by the manager, superintendent, foreman, charge hand or another operator and unless well planned, training on-the-job may fall short of expectations. The foreman may be too preoccupied with production problems to adequately attend to the requirements of training in his own department. The experienced operator (on the next machine or the adjoining bench) may be a first class operator but a poor instructor; he may withhold his knowledge for fear the imparting of it to another may jeopardize his job, he may not have assurance that any loss in time caused by instructing will be made up to him. For these and other reasons a periodic check is necessary to insure that the results expected from job training are obtained and that company policy is so designed and "put across" as to meet all the difficulties that may arise when the training function is accepted as a management responsibility.

War Emergency Training Program Prepared to Help

In the matter of training workers on-the-job the facilities of the War Emergency Training Program, through its Regional Directors are available to manufacturers. One of the ways in which help can be given is through its consulting service which includes the bringing into contact, company representatives and technical directors of vocational schools to discuss training program, teaching methods, etc., and also the bringing together of company representatives with a training problem to discuss and consultative advisers from other industries of whom a number have agreed to act in the interest of the war effort, without remuneration, in order to place their experience at the disposal of any manufacturer. These men are at present in industries producing guns, planes, tanks, ships, etc., and their experience in the development of training methods is available on request.

UP-GRADING TRAINING

Progressive managements acknowledge that training on-the-job begins but does not end with training persons to a point of proficiency in the use of unit skills. Too many one-job men are a potential weakness in any plant. If initial training on-the-job is not backed up by opportunities for promotion and up-grading to other and better jobs, labour turnover is increased through restlessness and dissatisfaction among those with greatest initiative and higher potential usefulness to the firm, precisely those persons whom it is in the interest of the plant to retain in its service.

In establishing a program for the up-grading of employees, following the introduction of a satisfactory method of initial training on-the-job, the employer must be guided by an appraisal of the advantages and disadvantages of such a program. The advantages may be apparent from a long range point of view but the disadvantages, being closer to the picture may outweigh the former and assume an importance out of all proportion to their true significance.

The usual objections raised to training men beyond their immediate point of usefulness are,—

(*a*) there will be a loss of production (temporary) by taking a man off his present job and breaking him in on a new one.

(*b*) a man is unwilling to be taken off his present job, in which he is proficient and is unwilling to accept a set-back in earnings (temporary), the result of taking on a new job on which he may be less proficient at the start.

Against these disadvantages should be considered the following advantages which should be labelled "permanent."

(*a*) Ultimate better production and lowered costs through using men with greater natural aptitudes and skills.

(*b*) Greater stability in the working force —less labour turnover—by giving capable employees a chance for promotion.

(*c*) Greater flexibility through reduction of number of one-job men.

(*d*) Less danger of being tied up if contracts and specifications change.

(*e*) Opportunity provided management to study the working force and discover potential supervisory material.

(*f*) The versatile worker is less likely to be laid off or unemployed.

From the above it will be seen that any disadvantages listed against the introduction of a program of up-grading are of temporary effect while the advantages are likely to be permanent and equally beneficial to the employer and the employed.

Before up-grading is applied to an organization as a whole and made an integral part of company policy it is essential that a careful and systematic job analysis be made of all jobs in the plant and that job specifications should be laid down with the object of discovering and laying down lines of promotion which in turn will permit of increases in earnings commensurate with those increases in skills and knowledges that will be developed through the training program. Only on such a foundation can an adequate program be developed.

Conclusion

Up-grading, as a means of providing for the lack of persons possessing higher trade skills is receiving more and more attention. The need for this development in training becomes more acute as industry expands. Generally the lack is not one of manual skills so much as one of technical and trade knowledge and the training process is referred to as a "plan for advancing employees within the organization to increase their knowledge and skills while producing." Up-grading, therefore, may involve supplementary instruction both on and off the job. Where the occupational structure of an organization provides for apprenticeships, improver and helper classifications, up-grading is accomplished through the simple process of accelerating the rate of promotion of individuals to higher categories but this process has definite limitations and soon the need for introducing special training aids becomes imperative.

The aids generally used to meet the deficiency are homestudy courses and supplementary classes in technical subjects, the latter being largely supplied through the facilities of the War Emergency Training Program. Classes for groups of employees are arranged to suit the convenience of the manufacturer and may be held on his premises if suitable accommodation is available. Generally, however, they are held at night or after shift in classrooms in the various Government Training Centres throughout the country.

A portion of the Aircraft Industry's up-grading program is being handled both by the intensive training in a residence school of some hundred key men and by homestudy groups totalling over a thousand men. Both these projects were initiated under the auspices of the War Emergency Training Program.

APPENDIX

Statement by the DeHaviland Aircraft Company on its Training On-the-Job and Up-grading Program.

The following statement by the DeHaviland Aircraft Company on its job training and up-grading experience will be of interest as a practical illustration of how one company has recognized and met its training problem.

The industrial expansion which followed the outbreak of war in 1939 presented a serious problem to the manufacturer, particularly to the manufacturer of war material. There existed a potentially large labour supply, but owing to the protracted period of depression which had preceded the war, the supply was largely untrained in the trades or even in factory work. Employers competed for the available trained labour and raised an immediate cry for Government sponsored training classes. The Government, anticipating the need, was already arranging for the opening of such classes.

Necessarily, the courses provided under such a scheme were of a primary nature and were given on the assumption that trainees would complete training "on the job". In theory, this assumption was sound, for most firms had pre-war employees whose production and personal characteristics permitted their being raised to foremanships and other positions of leadership and responsibility. However, in most of the war industries, the rapid and continuous growth of plant and personnel, necessitated the whole time effort of its capable men to be applied to production problems with the result that post-employment training could not be properly organized. The ambitious and alert employee gained knowledge and rank by his or her personal effort, while the less progressive lagged behind in the minor jobs, or were dismissed because of lack of training.

When it is realized that this firm has grown from 60 in August 1939, to 200 at December, 1939; 1,200 at December 31st, 1940; and 3,200 at December 31st, 1941—the extent of the training and other problems is apparent.

Through changes in production methods and diversification of work the placing of untrained workers became possible—BUT—immediate steps had to be taken to bring acceptable workers to higher efficiency and to discover those with leadership or foreman capabilities. In view of the fact that we are working on a ten-hour shift and are removed from the urban area, this work cannot be carried out in the ordinary training classes, but must be done on the premises and on Company time.

Steps are now being taken to procure Government assistance in the provision of classrooms and teaching staff; the classes to be conducted both on the day and night shifts, with a possible number of 80 members training on each shift or a total of 160 at one time. The number of classes may be increased. Any employee may apply for entrance to the classes, but acceptance will depend on the decision of a Board which will consider the applicant's personality; work reports; foreman's recommendation, and type of training requested. Acceptance by the Board will indicate that the trainee has been marked for better things, and this feature will tend to heighten the morale of all employees.

Classroom training with free use of blackboards will be given rather than training of the work shop type, this procedure being followed in view of the fact that the trainees are engaged on the work in which they are to be progressed. Each trainee will continue his or her plant rate while attending classes.

One feature of the training will be that accepted students must pass a preliminary course in order to establish their capacity to benefit from the selected trade course. The subjects in this preliminary course will be—

(*a*) Care of aircraft and aircraft parts before and after assembly.
(*b*) Elementary mathematics.
(*c*) Blue print reading.

It has been clearly established in our blue print reading classes that a lack of elementary mathematics has proven the greatest stumbling block. It is estimated that 80% of those who failed to complete these classes were forced out by an entire lack of knowledge of decimals, fractions, etc.

Before arriving at a decision to inaugurate post-employment training on a part-time basis in schools within the plant, the question of correspondence and other outside courses was given full consideration, but it was finally decided that no alternative method could produce the results of that suggested. The principal difficulty of other types of courses is the fact that only the extremely ambitious could sustain interest in instructional work which would be carried on after a ten-hour day, and it is doubtful whether the mathematical portions of correspondence or other courses could be assimilated under these circumstances.

Different plants and industries have different requirements, and it is the considered opinion of the writer that our plant must carefully consider its own requirements, and then embark on a type of training which will most closely meet its needs, and that the curricula of such training must necessarily cover the individual plant's operations rather than be of a general nature.

VERTICAL UP-GRADING PLAN IN OPERATION BY CANADIAN INTERNATIONAL PAPER AND AFFILIATED COMPANIES.

The following statement furnished by Canadian International Paper is a practical working example of the vertical up-grading method.

Reasons for the Plan

A definite shortage of skilled tradesmen is being experienced in the industrial phase of Canada's war effort. In the past industry has been and must continue to be the principal training ground for such tradesmen. It, therefore, has a definite and direct responsibility to do its utmost to overcome the present shortage and to protect against its recurrence. Although the Government has not yet made a specific request to industry to train men in the essential trades, some concerns are voluntarily accepting this responsibility by inaugurating plans with this end in view.

Ever since the declaration of war, many of our employees who, for one reason or another, are unable to join the fighting forces of the country, have repeatedly expressed the desire to assist in the prosecution of the war in some practical manner; to many of these the present Plan offers the opportunity, which until now has not been available to them, to make a definite contribution to their country in this time of national need.

Accordingly, Canadian International Paper and Affiliated Companies and their employees wish to share in such a program and to make their contribution thereto as vigorous and helpful as possible.

The Company's Training Plan for development of skilled and semi-skilled tradesmen, provides for instruction in the following trades:

Mechanical Trades—
1. Machine shop work
2. Blacksmithing
3. Pipe fitting
4. Welding
5. Millwrighting
6. Tinsmithing

Steam Plant Work
Electrical Work

The organization for carrying out the Plan consists of the following:

A Director of Training
Training Advisory Boards
Managers of Training
Instructors
Advisers

Director of Training: The entire Training Plan is under the general supervision of the Director of Training, who is answerable to the Management at Montreal for the successful prosecution of the Plan at all mills.

Training Advisory Boards: There is a Training Advisory Board at *each mill* which assumes supervision of, and is answerable to the Director of Training for the functioning of the Plan at that particular mill. This Board consists of the following officers and members:—

A Chairman, who is the Mill Manager
An Assistant Chairman and Manager of Training, who is the Plant Engineer
A Secretary, who is the Personnel Supervisor
Members, who are the General Superintendent, Mill Engineer, Master Mechanic, Steam Superintendent, Electrical Superintendent

Managers of Training: The Manager of Training is directly answerable to the local Training Advisory Board and assumes full responsibility for the detailed operation of the Plan.

Instructors: Instruction in the six courses covering the mechanical trades is under the direct supervision of either the Master Mechanic or the Mill Engineer, and is given by them and by Instructors who are recruited among the foremen and skilled tradesmen employed in the various Departments of the Plant.

Instruction in Steam Plant Work is under the direct supervision of the Steam Superintendent, who may appoint other instructors, depending on local conditions.

Instruction in Electrical Work is under the direct supervision of the Electrical Superintendent, who may appoint other instructors depending on local conditions.

Advisers: The Manager of Training assigns each student to a special Adviser. These advisers are chosen from men thoroughly competent in their own trades and who are willing to devote the necessary time for a sympathetic discharge of such duties. Students are urged to call on their Advisers whenever help is desired in connection with their training and the Advisers follow both the home studies and practical work of the students to ascertain whether normal progress is being made.

Students: Students are divided into two groups:

Group A: In this group are included semi-skilled men now employed in the Mechanical, Steam or Electrical Departments who have the necessary qualifications to enable them to undertake the technical studies involved in the Training Plan.

Group B: In this group are placed men now employed in other than the Mechanical, Steam or Electrical Departments.

Length and Nature of Courses

Because time is so definitely limited and in order that this Training Plan may be of the maximum usefulness to the Country, the training period has been limited to twelve months. While it is recognized that a fully skilled tradesman cannot be trained within a year, investigations indicate that a satisfactory basic training can be imparted in that time and men who satisfactorily complete any of the given courses will unquestionably be able to take their places in industry and, working from this base, rapidly acquire the balance of manual skill necessary to assume positions of responsibility in their chosen trades.

The Plan consists of two parts; home study courses to provide the necessary theoretical training, and practical shop instruction conducted simultaneously with the home study to develop the required manual skill. The Plan also offers an opportunity to gain valuable training more quickly and at an appreciably lower cost than could be arranged under other circumstances.

Home Study Courses: Arrangements have been completed with a well-known correspondence school organization, for the necessary home study courses. The grouping of the individual subjects into these Special Trade Courses has been carefully worked out by the Director of Training in conjunction with the staff of the correspondence school with the end in view of including therein all essential subjects and eliminating all the necessary texts.

Examinations in each subject will be given by the correspondence school and taken by the students at intervals fixed by the Director of Training. All such examination papers will be corrected by the staff of the correspondence school and returned to the local Manager of Training, together with pertinent comments on each student's progress.

Subject only to the restriction that a student must complete each subject at a rate commensurate with the successful conclusion of the Course within one year, the amount and rate at which home study work will be assigned to the student is limited only by his capacity to absorb the information to the satisfaction of the examining staff of the correspondence school.

Practical Shop Instruction: The full text of the respective home study courses is made available to the Instructors to enable them to properly co-ordinate the theoretical and practical portion of each student's training. Of necessity, due to the basic difference between students in Group A and students in Group B, the method by which each group will receive this practical instruction varies.

Students in Group A continue in their present occupations and obtain as much practical training as possible from that source, every effort being made to assign them to jobs which will extend and broaden their experience. When it is found impossible to give the student all the necessary practical work through the medium of his daily duties, he is required to attend, after working hours, such instruction classes as are specified from time to time by the Training Advisory Board.

Students in Group B continue in the present occupations until an opportunity presents itself to join the staff of the Mechanical, Steam or Electrical Departments. Where a student's present occupation precludes adequate practical instruction during working hours, he is required to attend instruction classes after working hours. Each student in Group B is required to complete a minimum of 300 hours of such practical instruction in connection with the Special Trade Course taken. These classes are held twice a week, each session lasting three hours.

Selection of Students

All men selected as students should possess the following educational qualifications:—

(*a*) Must be able to read and write English. This is essential inasmuch as the home study courses are not available in any other language at this time.

(*b*) Should preferably have completed grade school mathematics, as a good grounding therein is desirable in any of the trades in which training is being given.

Beyond the specific educational standards enumerated above, certain broad principles govern the choice of students:

(*a*) As this Plan has been undertaken to supply man power for other industries as well as our own, students should be selected from among those men who, for one reason or another, are unacceptable in the military forces but who are not incapacitated for industrial work.

(*b*) Before final acceptance as a student, each man under consideration must signify that he has every intention of completing the course and especially in the selection of students for Group B great care must be exercised to secure men who are eager to learn a trade and show aptitude for the work covered by the course to be chosen.

(*c*) The number of students selected for Group A should be limited only by the training facilities available. The number selected for Group B should be limited to approximately twenty-five men at each mill, as larger groups would become unwieldy and render impossible the personal supervision of the work of each student by the Instructors.

The exact method of recruiting students at the different mills is left entirely to the discretion of the local Training Advisory Board.

Financing of the Plan

The cost to the student for the home study course pertaining to the Special Trade Course selected is $64.25, payable at the rate of $1.25 per week through the medium of payroll deductions, the total amount having been paid in advance by the Company to the correspondence school. Authority for the above mentioned payroll deductions is obtained from each student before enrollment.

There is no charge to the students for the practical instruction courses, although in certain cases it may be necessary for them to provide a limited number of small tools for their own use in connection with this work; such tools, of course, remain the property of the student.

Canadian International Paper and Affiliated Companies bear all other expenses such as:—

(*a*) Course texts for Instructors

(*b*) Wages earned by hourly paid Instructors for time spent giving practical instruction

(*c*) All supervision expense.

The students accepted for these courses do not receive any remuneration for time spent attending instruction classes after working hours.

Conclusion

The question of what advancement will be possible at the completion of these Special Trade Courses will undoubtedly be raised from time to time. Naturally we are not in a position to predict how many men can be absorbed in each mill's staff in capacities other than those in which they are now employed, nor can it be expected that a larger number will be employed in the Mechanical, Steam and Electrical Departments than the work in progress requires. It is needless to say, however, that replacements and necessary additions in these Departments will be obtained from among those who have successfully completed these Special Trade Courses. It is therefore expected that on completion of these Courses students will continue in their present occupations until such time as other openings occur either in our own plants or in others engaged in war work.

The Management of Canadian International Paper and Affiliated Companies believes that in establishing this Training Plan, it is making a definite contribution to Canada's war effort, and it is therefore vitally interested in the results which are achieved. Consequently, it expects the loyal co-operation of every employee participating in the Plan in whatever capacity, as it is only by this means that the Plan can be carried out successfully.

Rotative Up-grading Plan in Operation at Sorel Industries Limited

Besides providing for movement of operators in one direction, namely upwards, up-grading has been applied as a rotative process. This involves a continuous training process of all operators in a plant both in technical and practical subjects. The advantage claimed for this system is that operators do not become stale, are more satisfied employees and, therefore, better producers. The following is a statement of the experience of Sorel Industries Limited in the rotative system of up-grading.

The plant training program of this company is perhaps one of the most complete and effective to be found among the larger firms engaged in the heavy metals industry. Fundamentally the program provides for the complete training, as machinists, of all its mechanical staff which is in contrast to the principle of training each individual for one operation, which each is required to perform with monotonous regularity for the duration of his employment.

The plan has been in operation sufficiently long to prove to the satisfaction of the management that the practice of rotating men from shift to shift and operation to operation does not noticeably interfere with the volume of production, as might be expected, largely because any possible loss

through this method is offset by elimination of monotony through the creation of interest in new machines and processes.

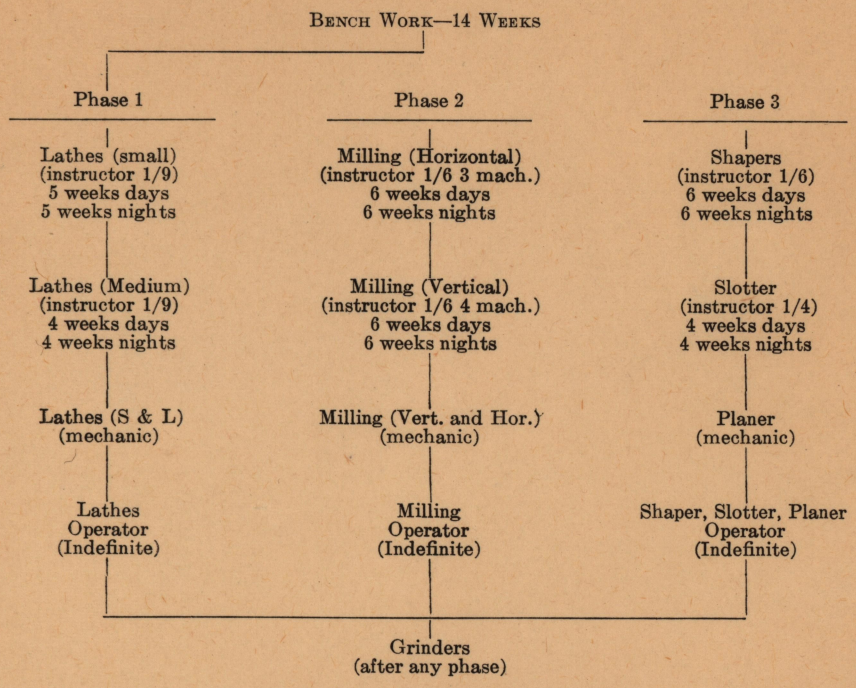
Study of the attached chart will show the schedule of training provided for each trainee. It should be noted that productivity commences after the 14th week of bench fitting, *i.e.*, on the first machine operation. Spoilage is said to be remarkably light.

At the time of investigation there were 68 trainees in the preliminary bench fitting section in various stages of development. In the machine tool, bench fitting and tool room sections there were 370 trainees at various points of the schedule. The training of the complete organization is the responsibility of a staff of 12 instructors and 4 assistant foremen.

PLANT TRAINING PROGRAMME

OF

SOREL INDUSTRIES LIMITED, SOREL, QUE.



Final Phase or Phase 4 Training
is given to better machine operators and consists of high precision work on assembly bench or tool room bench.

Key to abbreviations used in chart:

(1) 1/9, 1/6, 1/4 means one instructor to 9, 6, 4 trainees respectively.
(2) S & L means small and large.
(3) Indefinite period at the end of each phase is conditioned by the intake of trainees and amount of time required to be spent in grinder section of shop.
(4) Mechanic—at this stage operating mechanic takes place of instructor.